NHB–3
TROUBLESHOOTING INSTRUCTIONS

AMENDMENT RECORD SHEET

Amendment Number	Date	Inserted By	Comments

NHB–3 TROUBLESHOOTING INSTRUCTIONS

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Introduction

General

The purpose is to define fault block of the module and then find out the broken component. The trouble shooting diagram has been planned so that the fault, whatever it is, can be found by as simple measurements as possible.

The flow diagrams give you the overview of the blocks. The purpose is that you proceed through the flow diagram so that, if your answer is YES for the asked question, go straight to the next level, but if your answer is NO, you have to go the subbranch.

Required servicing equipment:

- PC for PC locals
- Power supply (2.0 A)
- Digital multimeter
- Oscilloscope
- Spectrum analyzer
- RF cables
- Modular cable
- RS232/MBUS adapter
- CMT/Marconi
- RF measuring chassis

Baseband Troubleshooting

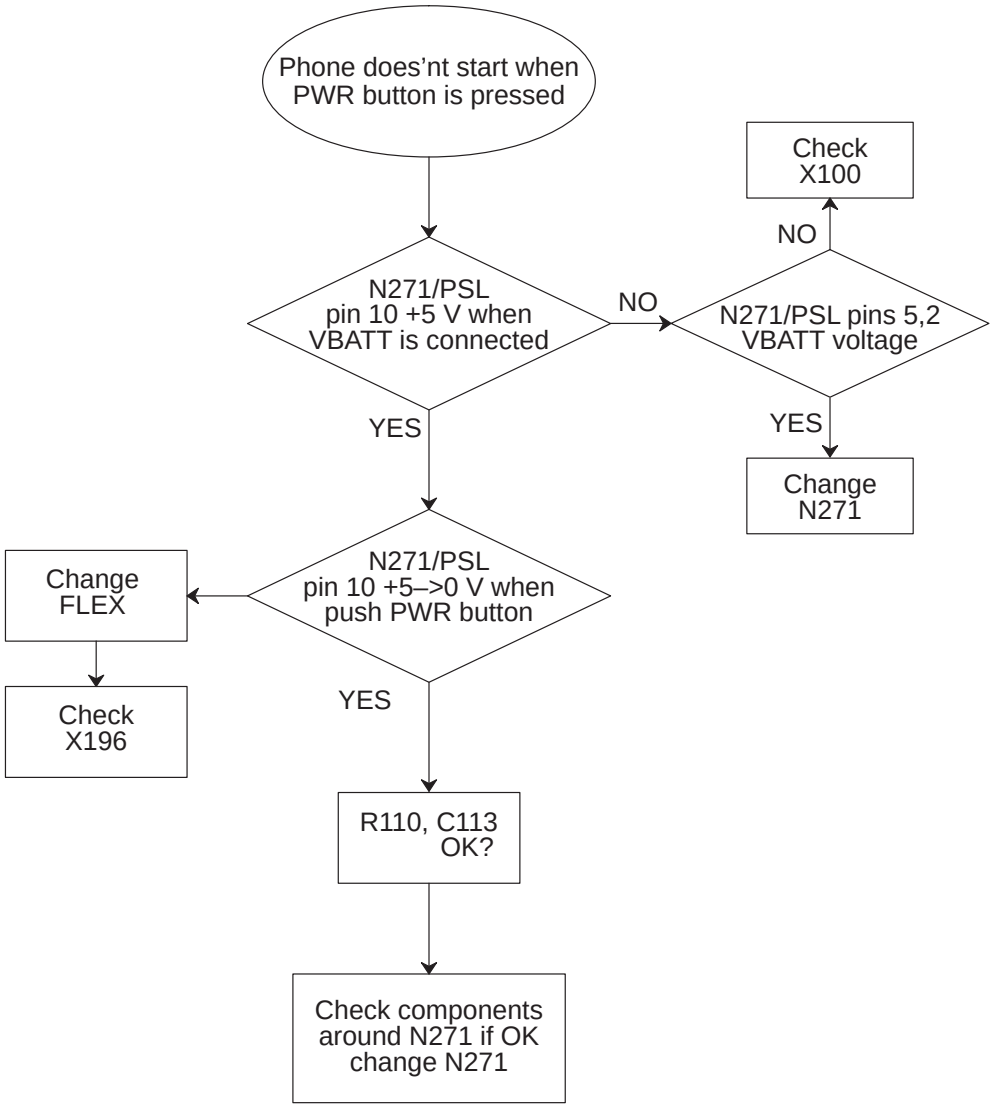
The following hints should facilitate finding the cause of the problem when the circuitry seems to be faulty. This troubleshooting guide is divided into the following sections.

1. Power button fault
2. Display self test failed
3. No registration to the system
4. Audio fault
5. Flash programming; part 2
6. Flash programming; part 3
7. Flash programming; part 4

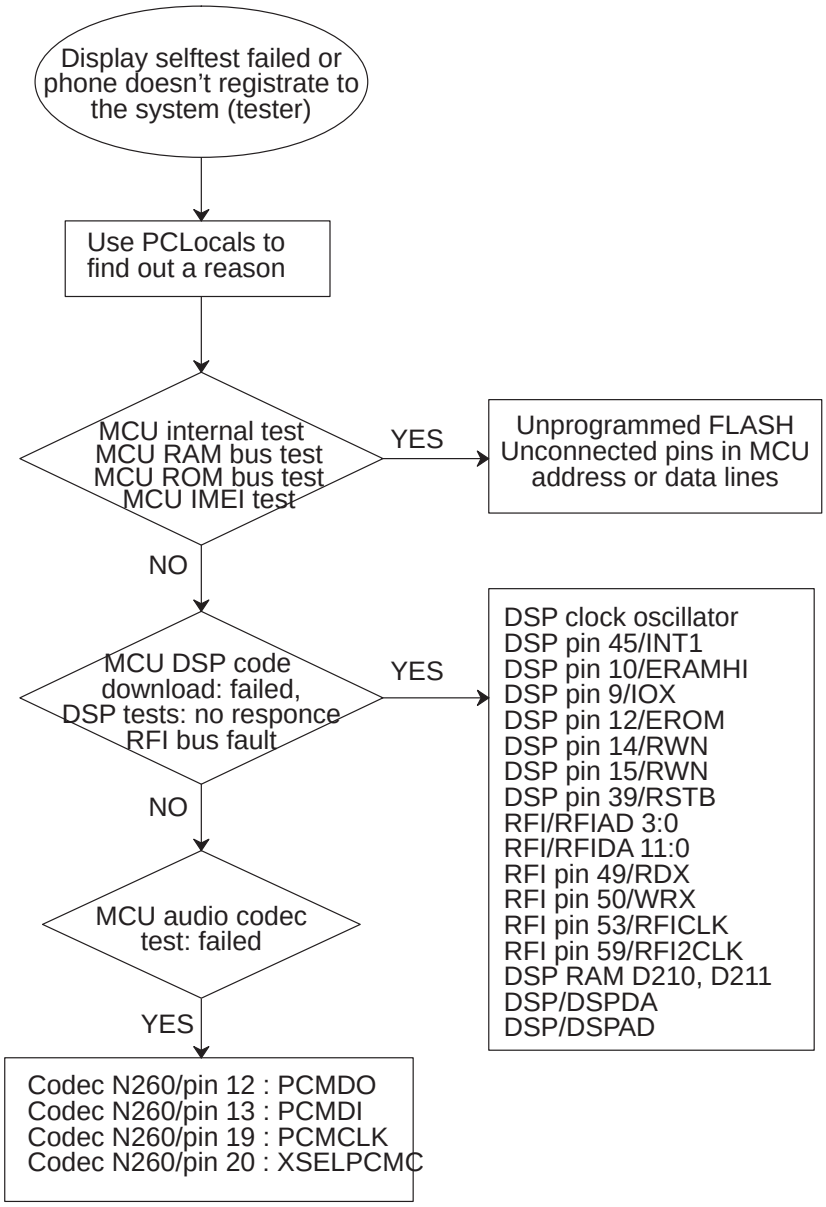
The first thing to do is to carry out a thorough visual check of the module. Ensure in particular that:

a) there is not any mechnical damage
b) soldered joints are OK

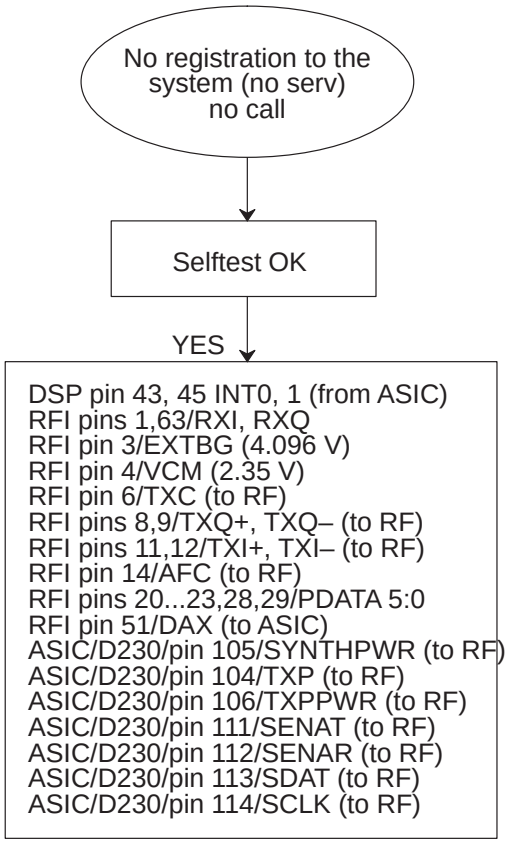
PWR Button Fault



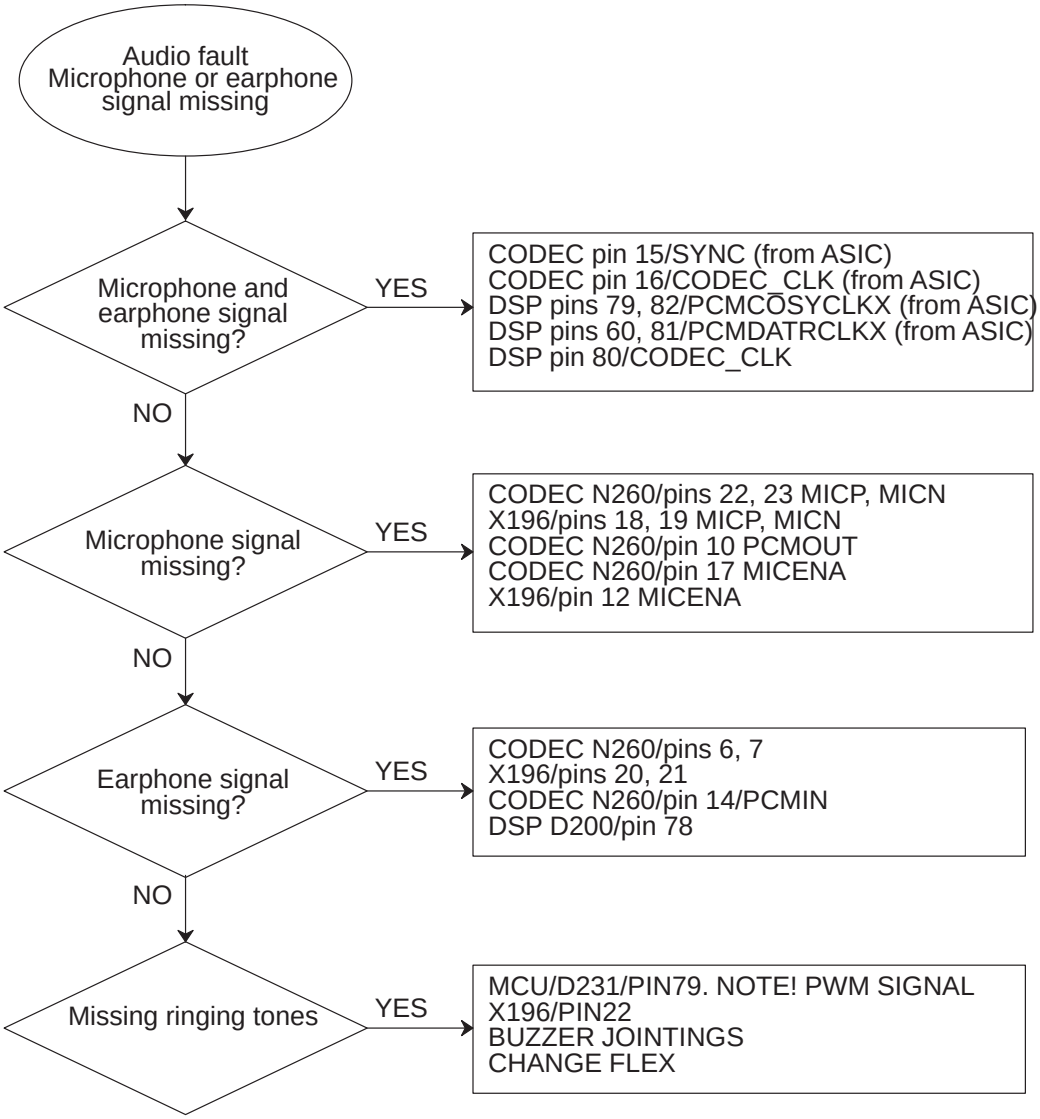
Display Selftest Failed

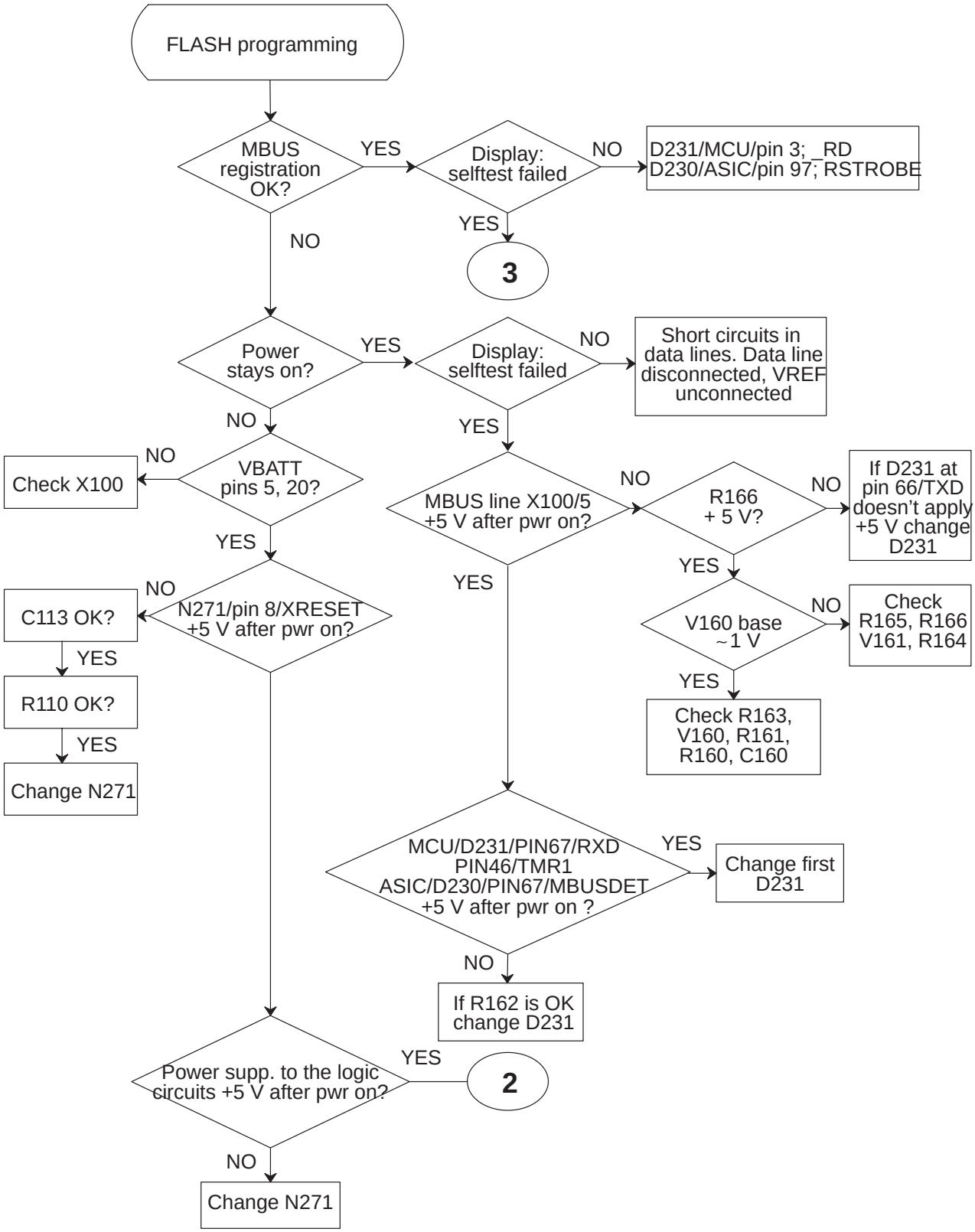


No Registration to the System (no serv)

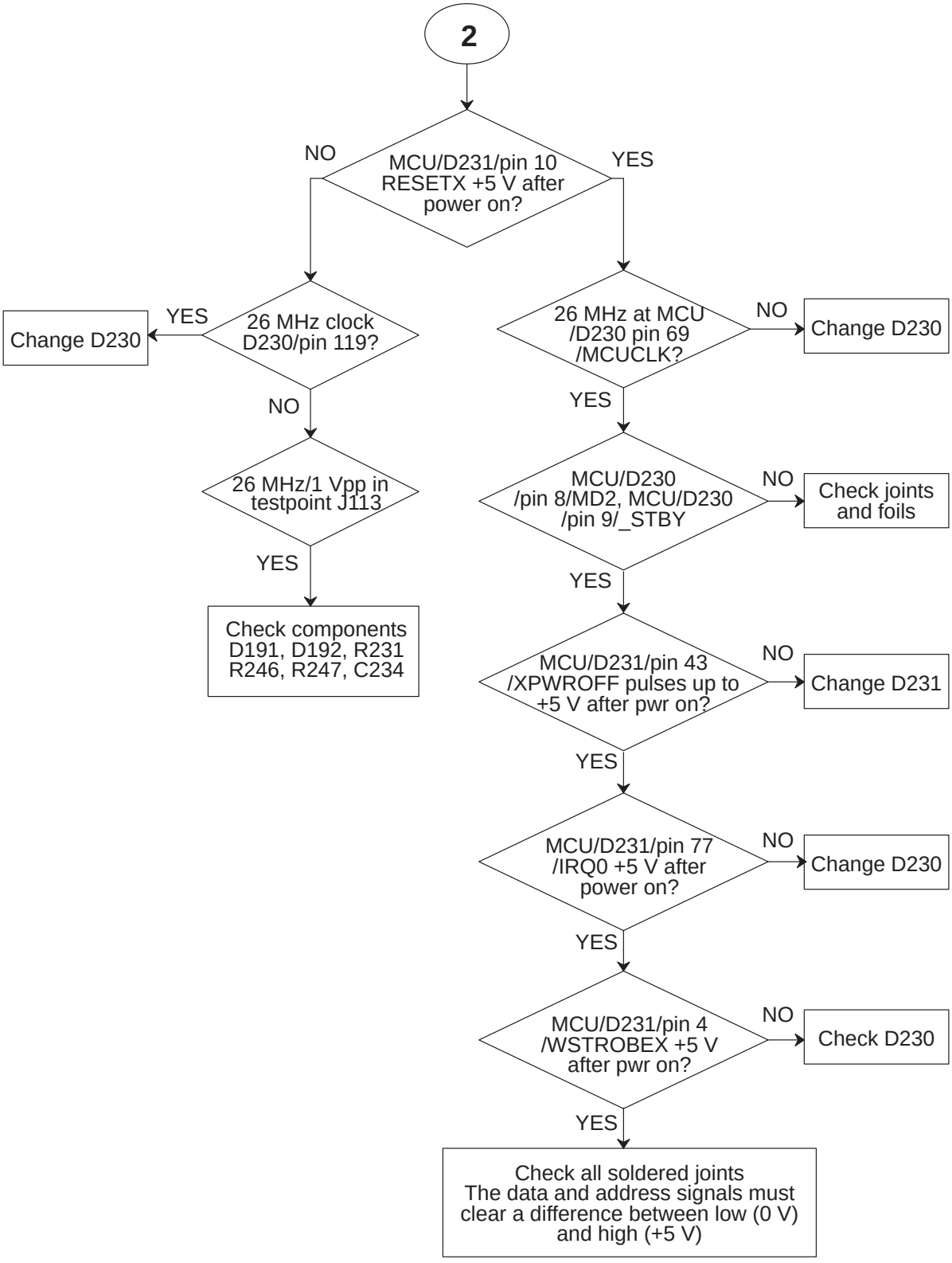

No registration to the system (no serv) no call
Selftest OK
YES
DSP pin 43, 45 INT0, 1 (from ASIC)
RFI pins 1,63/RXI, RXQ
RFI pin 3/EXTBG (4.096 V)
RFI pin 4/VCM (2.35 V)
RFI pin 6/TXC (to RF)
RFI pins 8,9/TXQ+, TXQ– (to RF)
RFI pins 11,12/TXI+, TXI– (to RF)
RFI pin 14/AFC (to RF)
RFI pins 20...23,28,29/PDATA 5:0
RFI pin 51/DAX (to ASIC)
ASIC/D230/pin 105/SYNTHPWR (to RF)
ASIC/D230/pin 104/TXP (to RF)
ASIC/D230/pin 106/TXPPWR (to RF)
ASIC/D230/pin 111/SENAT (to RF)
ASIC/D230/pin 112/SENAR (to RF)
ASIC/D230/pin 113/SDAT (to RF)
ASIC/D230/pin 114/SCLK (to RF)

Audio Fault

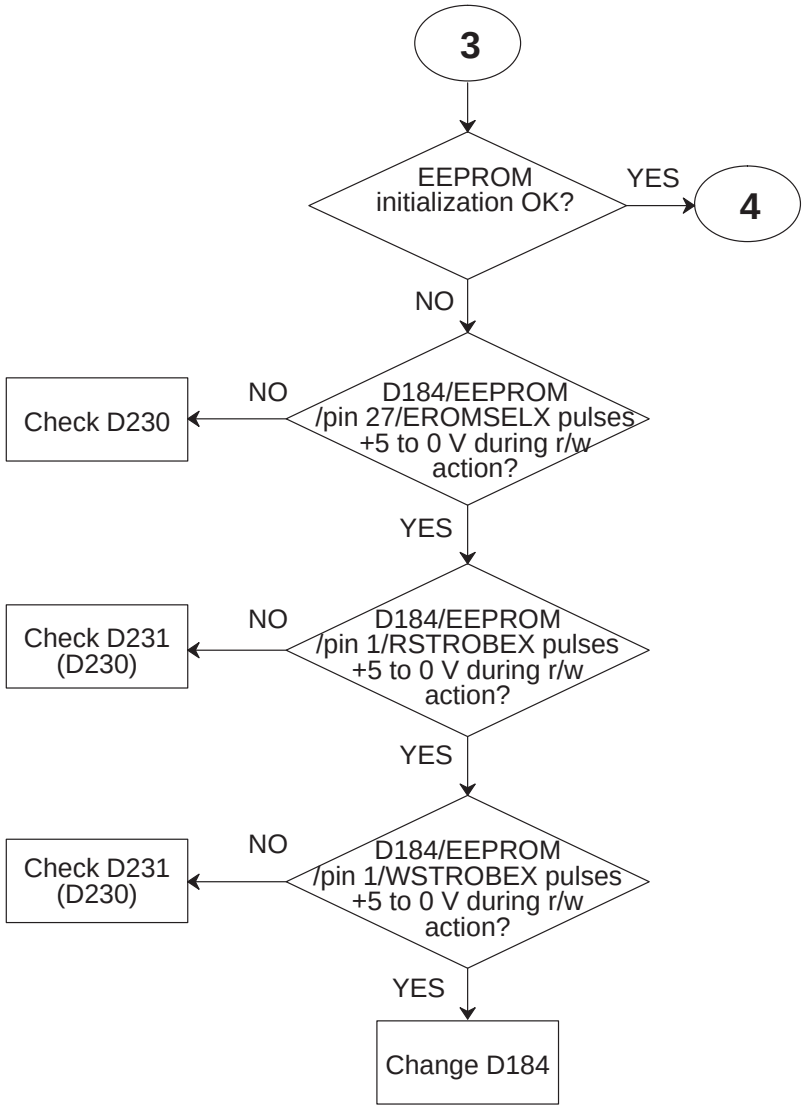

Audio fault
Microphone or earphone signal missing
Microphone and earphone signal missing?
YES
CODEC pin 15/SYNC (from ASIC)
CODEC pin 16/CODEC_CLK (from ASIC)
DSP pins 79, 82/PCMCOSYCLKX (from ASIC)
DSP pins 60, 81/PCMDATRCLKX (from ASIC)
DSP pin 80/CODEC_CLK
NO
Microphone signal missing?
YES
CODEC N260/pins 22, 23 MICP, MICN
X196/pins 18, 19 MICP, MICN
CODEC N260/pin 10 PCMOUT
CODEC N260/pin 17 MICENA
X196/pin 12 MICENA
NO
Earphone signal missing?
YES
CODEC N260/pins 6, 7
X196/pins 20, 21
CODEC N260/pin 14/PCMIN
DSP D200/pin 78
NO
Missing ringing tones
YES
MCU/D231/PIN79. NOTE! PWM SIGNAL
X196/PIN22
BUZZER JOINTINGS
CHANGE FLEX


FLASH programming
MBUS registration OK?
YES
Display: selftest failed
NO
D231/MCU/pin 3; _RD
D230/ASIC/pin 97; RSTROBE
YES
3
NO
Power stays on?
YES
Display: selftest failed
NO
Short circuits in data lines. Data line disconnected, VREF unconnected
NO
YES
Check X100
NO
VBATT pins 5, 20?
MBUS line X100/5 +5 V after pwr on?
NO
R166 + 5 V?
NO
If D231 at pin 66/TXD doesn't apply +5 V change D231
YES
YES
YES
C113 OK?
NO
N271/pin 8/XRESET +5 V after pwr on?
V160 base ~1 V
NO
Check R165, R166 V161, R164
YES
YES
R110 OK?
YES
Check R163, V160, R161, R160, C160
Change N271
MCU/D231/PIN67/RXD PIN46/TMR1 ASIC/D230/PIN67/MBUSDET +5 V after pwr on ?
YES
Change first D231
NO
If R162 is OK change D231
Power supp. to the logic circuits +5 V after pwr on?
YES
2
NO
Change N271

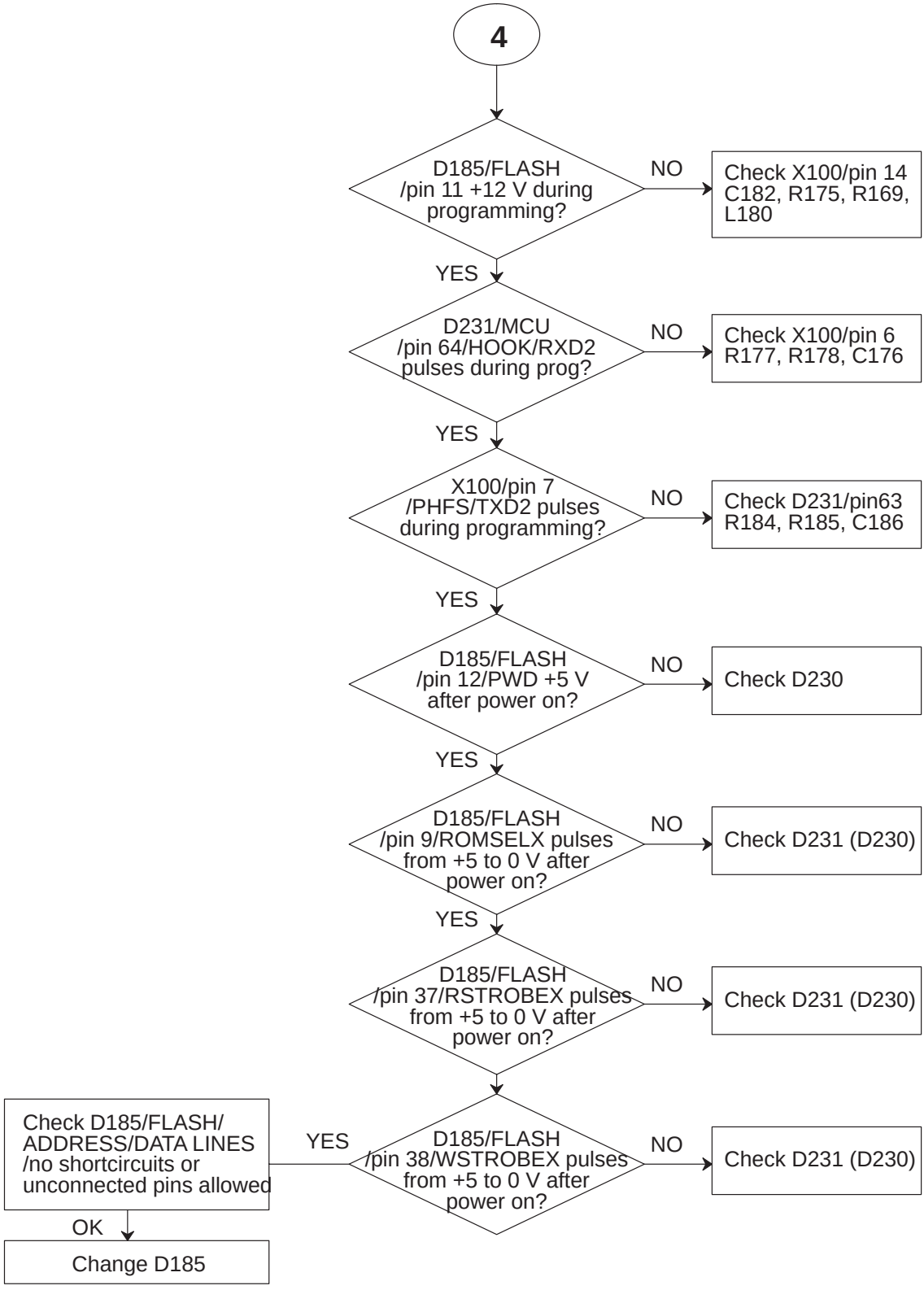
Flash Programming ; part 2



Flash Programming ; part 3



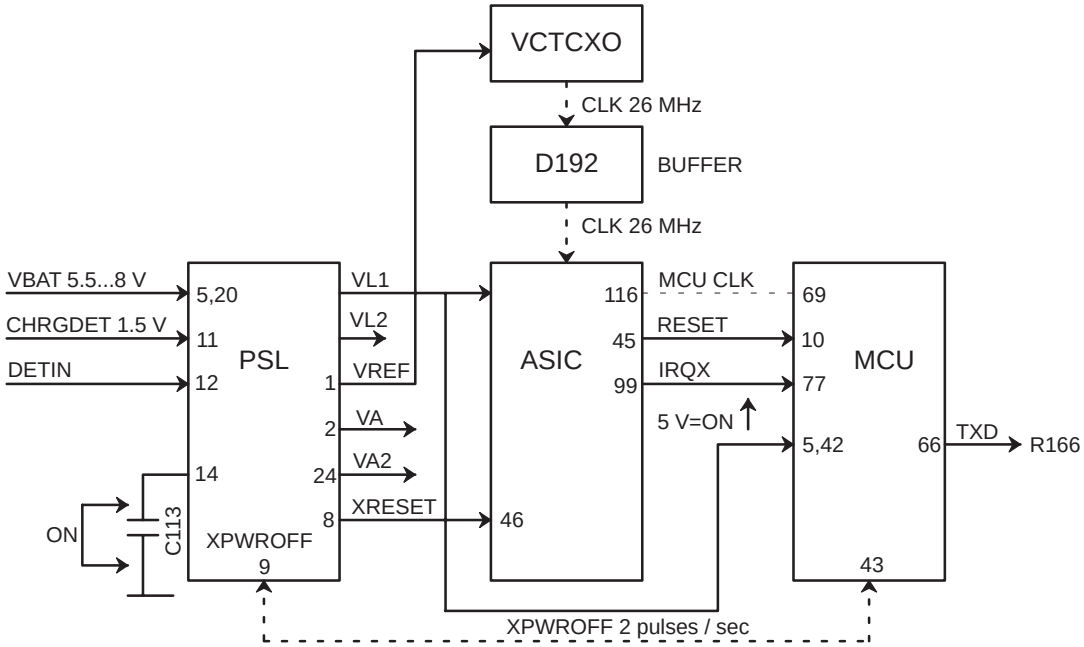
Flash Programming ; part 4



Some BB measurements for reference

	Test point	Frequency / DAC	Level	Note
1	N271 : 5, 20			VBatt
2	N271 : 2 / 24 / 1		4.6 V	VA1 / VA2 / Vref
3	L272		4.6 V	VL 1
3	L273		4.6 V	VL 2
9	R279		4.6 V	DSPCLKEN
6	D200 : 37, 38	60.2 MHz	> 400 mVpp	DSPCLK
11	D200 : 40	30 MHz		CKO
7	D200 : 39		4.6 V	DSPIRSTX
8	D200 : 43, 45		~ 0V	INT0, INT1
5	D231 : 69	26 MHz	~ 5 Vpp	MCUCLK
12	D231 : 10		4.6 V	RESETX
13	D231 : 77		4.6 V	IRQX
10	D231 : 66, 67		4.6 V	RXD,TXD (no traffic)
14	D231 pin 52		~ 3 V	VBATDET
15	D231 pin 53		~ 1.5 V	VC
16	D231 pin 54	DAC : ~ 1020	4.6 V	HOOK
17	D231 pin 55	DAC : ~ 460	~ 2.1 V	TBAT
18	D231 pin 56	DAC : ~ 480	~ 2.1 V	TRF
19	D231 pin 57	DAC : ~ 250	~1.1 V	BTYPE

Power circuitry



PSL

– Output voltages must be stay at high state at least 1.5 s when power is switched on.
– If no; check C113.
– If it is OK; replace PSL.
– If the XRESET line doesn't rise check CHRDET and DETIN. The voltage value at these pins should be 1.5 V.

ASIC

– When XRESET and CLK are supplied to the ASIC but MCUCLK or RESETX to the MCU are not supplied; replace ASIC.

MCU

– If MCUCLK and RESETX are supplied from ASIC but TXD line (MBUS) doesn't rise and solderings of the MCU are good; replace MCU.
– If TXD pin (MCU) goes to high but doesn't stay at high state at least 1.5 s.

The power of the phone can be hold on following way:

– Connect PSL pin 14 to the ground.
– Lift MCU pin 77 IRQ0 and connect it to VL1.

Now its possible to use PCLocals software.

Repairing Instructions for Flash Faulty Units

1. When the phone doesn't start (power off after 2 seconds) check following things:
   - VBATT is connected to the PSL N271
   - XRES rise to high state
   - VL1 is 4.7 V
   - VREF is connected to the VCTCXO and the crystal is running frequency is 26 MHz

   Measure:
   - supply voltage of MCU D231
   - reset signal for MCU (RESETX) rise high state
   - MCU clocksignal is 26 MHz
   - NMI line stay low
   - IRQ0 rise high state

   If things (mentioned above) are ok, the MCU starts supply poweroff pulses to the PSL N271 and the power stay on.

   Most likely IRQ0 stay low, which means that interrupt is generated all the time.

   In these cases check data and addresslines of MCU's and memory circuits. There are shortcircuits or unconnected pins.

   The power can be forced stay on by connected PSL N271 pin 14 to the ground.
2. When FLASH PROGRAMMING is not succeed, check following things:
   - System connector X100 pins 6, 7, 14 are soldered and there are no shortcircuits.
   - Flash programming voltage (12 V) is connected to D185 pin 11.
   - The data and addresslines of flashcircuit D185 are soldered.
   - EEPROM D184 should be OK because of the initialization (program parameters are loaded always when program is loading the first time).
3. When FACTORY SET is not succeed or the power is switched off after programming:

   When power is switched on the program of the phone will start so called maximum mode and if this doesn't work there has been a fault during the flash programming.

4. If selftest (A) is failed, check:
   - Solderings of EEPROM D184
   - Do factory set once again (setup error in EEPROM D184)
5. If selftest (B) is failed, check:
   - Measure by oscilloscope that crystal XT1 is running (60.2 MHz).
   - Reset signal DSP1RSTX for DSP (D200 pin 39) is high state.
   - Small clock signal at pins 37, 38 of DSP is greater than 400 mV_{PP}.
   - Clock signal at pin 40 (DSP) is 30 MHz (square wave; amplitude 5 V).
   - Check solderings of D200, D210 and D211.
6. If the phone takes too small current measure at pins of synthesizer that it's working normally.
7. If the phone takes too high current check the outputs of RF regulator that supply voltages are OK.

RF Tuning Fails

Calib Temperature Sensor

a) Check R809 and R173

b) Check D231 pin 56

AFC Fails

a) Check AFC control voltage; G1 pin 5

b) Check that RX inj. freq. changes when AFC value is changed in PCLOCALS; G1 pin 1.
c) Check that correct inj. freq. can be accessed with reasonable AFC values (–1024...1024); G1 pin 1.

c) Check RX branch gain (see RX signal levels)

d) If a, b and c is OK then check solders of N270 –> change N270

RSSI Fails

a) Check RX branch gain

b) check solders of N270, D200 and D230

TXI/TXQ Tuning

Carrier leagage must be tuned with shields and edge clip on and screws tighten.

Upper side bands amplitude is not allowed to tune to its minimum with amplitude and phase tuning. Because if the data type is changed to another then the USP signal will be higher => TUNE TO BALANCE.

If there is no signal at N551 pins 21...24, check N270 solders.

IF there is not signal at N551 pin 28 => check input level at pins 16 and 19 and control pulse at pin 31 .

Power Measuring

If there is not enough power at outputs, check power control loop, power amp. and duplex filter.

Power Tuning

Tune TXC values at TX levels 0, 5, 10, 11 and 15.

Calib BATT_VOLTAGE = 6.0 V

a) Check R112, R113

b) Check N271 pin 23

c) Check D231 pin 52

Calib CHARGE_VOLTAGE = 6.0 V

a) Check R140, R142

b) Check D231 pin 53

Repairing instructions for RF unit

Common features

NHB–3 receiver’s frequency band is 60 MHz. It starts at 1930,2 MHz and ends at 1989,8 MHz. This band consists 299 channels from 512 to 810. Receiver dynamic range is 96 dB that is composed of 39 dB gainstep in front–end and 57 dB gainstep in AGC–amplifier in CRFRT–circuit.

The frequency band of NHB–3 transmitter is 60 MHz between 1850.2 and 1909.8 MHz. Channel numbering and the amount of channels is similar to RX side.

TX signal is made by mixing UHF VCO signal and modulated TX intermediate signal in passive mixer. After mixing TX signal is amplified and filtered by two amplifiers and dielectric filters. The discrete power amplifier amplifies the TX–signal to desired power level. Maximum output level after duplex filter is 1.0 W (30dBm).

Duplex filter

HD851 uses helical duplexer which have 3.0 dB maximum insertion loss in receiving band. Minimum attenuation between TX and RX lines is 20 dB.

NHB–3 Receiver Functional Description

Measurements should be done using spectrum analyzer with high–frequency probe (LO–/reference frequencies and RF –levels) and oscilloscope (DC–voltages and the amplitude of the reference oscillator).

Front–end amplifier V501

The front–end amplifier operates with 5,5 mA current. Base and collector voltages are Vb=0,86V and Vc=3,44V. Front–end gain is controlled by signal PDATA0 which comes from RFI–circuit. PDATA0 controls the switching transistor V502. Because of low value limit of Vce of V501 the switch is placed in to the collector of it.

The gain in the front–end amplifier is about 13dB and the attenuation in off–state is about 26 dB. This means 39 dB gainstep when front–end is turned off. The signal level when front–end is switched off is –45dBm. Gain is reduced by feedback resistor R502 for stabilation of the amplifier and to improve the intermodulation in IF–parts.

RX–Filter Z505

3 pole ceramic filter is used as RX–filter. Filter has center frequency (f0) of 1960 Mhz and bandwidth of 60 Mhz. Insertion loss in passband is 2.2 dB maximum. Attenuation at the frequency of f0 +100 Mhz is 15 dB minimum and f0 +400 Mhz is 48 dB minimum.

First Mixer V511

Incoming frequency span is 60 MHz as in the front–end. Conversion loss is about 6dB maximum. Local signal is driven into the mixer at the level of 3 dBm. Local signal frequencies are in band of 1617,2 MHz to 1876,8 MHz.

First Local Buffer V512

Buffer operates with 4,7mA current. Base and collector voltages are Vb=0,77V and Vc=2,33V. This buffer has gain from 10dB t0 11,5dB depending the used channel (lowest channel has the lowest gain).

IF–amplifier V521

Amplifier operates with 5,7mA current and about 10dB gain. Gain is reduced by the feedback resistor R521 for stabilation and to improve intermodulation in later IF–parts. Also there is negative feedback done by C528 that is for the first local signal and it's harmonics. Base voltage of the transistor is Vb=0,85V and collector voltage Vc=2,1V.

IF–filter

First IF–filter is made to reject the mirror frequencies of second IF (487MHz).

Second Mixer V531

Second mixer converts 313 MHz first IF to 87 MHz second IF. Conversion loss is about 6 dB. Local signal is driven in to mixer at level of 3 dBm and the frequency is 400 MHz.

Second Local Buffer V532

Buffer is running at 6,5mA current and base and collector voltages are Vb=0,7V and Vc=2,2V. Buffer has about 10 dB gain.

If–amplifier V541

amplifier is running with 15mA current and about 14 dB gain. Base–emitter voltage of the transistor is Vb=0,95V and collector–emitter coltage Vce=2,98V.

IF–filter Z541

Second IF–filter is narrowband SAW–filter. It takes part of the neighbor channel filtering. Filter has about 10dB loss in passband.

AGC–amplifier

First part in the CRFRT–circuit is the AGC–amplifer that takes care of 57 dB gainsteps (20*3dB, 47 dB gain and 10dB attenuation). These gainsteps are controlled by analog voltage coming from TXC–line. Gainsteps are calibrated in RSSI–calibration (Front–end gain ON during the calibration).

Third Mixer

Third mixer located in CRFRT is active mixer that converts 87MHz second IF to 13MHz third IF. 400MHz second local signal is fed to CRFRT and divided by 4 for the 100MHz third local signal.

Third IF–filter Z551

Third IF–filter is ceramic filter that does a part of neighbor channel filtering. Filter has about 6 dB loss in passband.

Third If amplifier

Third IF–amplifier is located in CRFRT and it's a constant gain amplifier with 30dB gain. Signal is brought out with two pins that have different phase shifters after the CRFRT–circuit. With these phase shifter 90 degree's phase difference is accomplished. After the phase shifters signals are fed into the IQ–demodulator that is in RFI–circuit which is located in baseband area.

RX Signal levels and frequencies

Setting of PCLocals

Active unit	:	RX
Operation mode	:	Continuous
Continuous Mode	:	Channel 661
AGC	:	81 dB
AGC–DAC	:	771
Frontend	:	ON

Signal (–50 dBm, f=1960.06771 MHz) will be connected to the antenna connector.

Signal Levels at Front End

	Test point	Position	Frequency	*Level	Note:
Bias 1	V501 B		DC	0.87V	
Bias 2	V501 C		DC	2.54V	
1	Z505OUT		1960 MHz	–41.5 dBm	

Signal Levels at IF (1)

	Test point	Position	Frequency	*Level	Note:
Bias 3	V512 B		DC	0.76V	
Bias 4	V512 C		DC	2.3V	
2	C517/R510		1647 MHz	–8.4 dBm	
3	V512 C		1647 MHz	–1.0 dBm	
Bias 5	V521 B		DC	0.73V	
Bias 6	V521 C		DC	2.15V	
4	V521B		313 MHz	–43.8 dBm	
5	V521C		313 MHz	–35.2 dBm	

Signal Levels at IF (2)

	Test point	Position	Frequency	*Level	Note:
Bias 7	V532 B		DC	0.71V	
Bias 8	V532 C		DC	2.19V	
6	V532 B		400 MHz	–11.3 dBm	
7	V532 C		400 MHz	+9.5 dBm	
Bias 9	V541 B		DC	1.81V	
Bias 10	V541 C		DC	4.24V	
8	V541 B		87 MHz	–46.6 dBm	
9	V541 C		87 MHz	–26.0 dBm	

Signal Levels at IF (3)

	Test point	Position	Frequency	*Level	Note:
10	RXI		12.932 MHz	–3.7 dBm	
11	RXQ		12.932 MHz	–3.6 dBm	

TX Unit

Measurements should be done using spectrum analyzer with high–frequency probe (LO–/reference frequencies and RF –levels) and oscilloscope (DC–voltages and the amplitude of the reference oscillator).

Modulator circuit,TX–part of CRFRT (N551)

The modulator is a quadrature modulator contained in TX–section of CRFRT IC. I– and Q–inputs generated by RFI interface are DC–coupled and fed via buffers to the modulator. Local signal is divided by two in order to get accurate 90 degrees phase shifted signals to the I/Q mixers. After mixing signals are combined and amplified with temperature compensation controlled gain amplifier (TCGA). The gain of the 1st TX amplifier is about 3dB. The gain is controlled with power control signal TXC. Output of the TCGA is amplified and max. output level is –10 dBm.

Upconversion mixer (V702)

Upconversion mixer is a single balanced passive diode mixer. The local signal is balanced by printed circuit transformer. The mixer upconverts the modulated IF–signal that comes from quadrature modulator to RF–signal.

Conversion loss is 6–8 dB. Local signal is driven into the mixer at level of 3.0 dBm max. TX–frequency range is 1850–1910 MHz and local freq. range 1650–1710 MHz.

TX interstage filters (Z713 and Z727)

Filters are 3–pole ceramic filters. Center frequency f0 is 1880 MHZ and bandwidth is 60 MHz. Insertion loss in passband is 2.2 dB maximum. Attenuations of the filter are: 15 dB minimum at f0+/–100 MHz, 47 dB min. at f0–400 MHz and 45 dB min. at f0+ 400 MHz.

The filters reject spurious signals generated in the upconversion mixer. They also reject leakage of local–, image– and IF–signals.

1st TX–buffer (V710)

First TX–buffer is a bipolar transistor amplifier which amplifies the TX–signal coming from the upconversion mixer**.**

Collector current Ic is 5 mA,Vb=0.7V,Vc=1.9V and gain is about 6dB. Supply voltage is 4.5V.

2nd TX–buffer (V725)

Bipolar transistor amplifier which amplifies the TX–signal coming from 1st interstage filter. Ic=15mA,Vb=0.85V,Vc=3.0V and gain is about 14dB.
Supply voltage is 4.5V.

3rd TX–buffer (V736)

3rd buffer is bipolar transistor amplifier. It amplifies the TX–signal coming from 2nd interstage filter. Ic= 40 mA,Vb=0.84V, Vc=3.0V and gain is about 13 dB.
Supply voltage is 4.5V.

Power amplifier

Power amplifier is a two stage discrete amplifier (V756 and V 765). Power amplifier is specified for 6 volts operation. Gain is about 20dB.

Note! When low power levels (i.e levels 11–15) are used, power amplifier is NOT switched off.

Power control circuitry

Power control circuitry consists of power detector and a differential control circuit. Power detector is a combination of a directional coupler and a diode rectifier. The differential control circuit compares the detected voltage and TXC and controls voltage controlled amplifier (in CRFRT) and the power amplifier**.**

TX signal levels and frequencies

Levels are measured with HP high frequency probe 50Ω 10:1. Supply voltage 6.0V was connected via dummy battery (type BTS–4). PClocals was used to control the phone. The probe was connected to spectrum analyzer.

Settings of PCLocals

Active unit :TX (level 0 was used in measurements)
Operation mode :Burst
Continuous mode :OFF
Channel :661 (mid channel)

Signal levels of UHF VCO buffer (V701)

	Test point Position	Frequency	*Level	Note:
Bias 1	V701 base		0.75V	Bias
Bias 2	V701 collector		2.4V	Bias
1	V701 base	1680 MHz	–15 dBm	Local signal
2	V701 collector	1680 MHz	3 dBm	Local signal

Signal levels of 1st amplifier

	Test point Position	Frequency	*Level	Note:
Bias 3	V710 base		0.70V	Bias
Bias 4	V710 collector		1.9V	Bias
3	Z713 input	1880 MHz	–12 dBm	TX–signal

Signal levels of 2nd amplifier

	Test point Position	Frequency	*Level	Note:
Bias 5	V725 base		0.85V	Bias
Bias 6	V725 collector		3.0V	Bias
4	Z713 out	1880 MHz	–14 dBm	TX–signal
5	Z727 input	1880 MHz	0 dBm	TX–signal

Signal levels of 3rd amplifier

	Test point Position	Frequency	*Level	Note:
Bias 7	V736 base		0.84V	Bias
Bias 8	V736 collector		3.0V	Bias
6	Z727 out	1880 MHz	–2 dBm	TX–signal
7	V736 collector	1880 MHz	11 dBm	TX–signal

Signal levels of power amplifier

	Test point Position	Frequency	*Level	Note:
bias 9	V756/V765 gate		–3.8V	Bias
bias 10	V756/V765 drain		Vbatt	Bias
8	V756 drain	1880 MHz	24 dBm	TX–signal
9	Z500 TX	1880 MHz	31 dBm	TX–signal

Synthesizer

Measurements should be done using spectrum analyzer with high–frequency probe (LO–/reference frequencies and RF –levels) and oscilloscope (DC–voltages and the amplitude of the reference oscillator).

Brief describtion of the synthesizer

Reference oscillator

The reference oscillator is a discrete VCTCXO consisting of a 26 MHz crystal, BJT(V801) –oscillator circuit and buffer(V802). The tuning of the oscillator frequency is done via RFI–controlled AFC –line by changing the voltage over the capacitance diode V800. The appropriate changes in tuning voltages are based on the calculations performed by software (DSP). The output voltage of the 26 MHz oscillator signal is about 0.7Vpp.

NHB–3 uses National's LMX2331 Dual PLL –circuit (N820) for synthesizing both UHF and VHF LO –frequencies.

UHF–part of PLL

For UHF, the incoming oscillator frequency (26MHz) is first divided by 130 to form the 200 kHz reference frequency for phase comparison. Loop filter then low–pass filters the signal down to DC –level, which is used as a control voltage for VCO.

UHF –VCO

UHF –VCO (G1) is a discrete module, which is used to generate the first injection for RX (1617.2 ... 1676.8 MHz) and the final injection for TX (1650.2 ... 1709.8 MHz). The output frequency of the module depends on the DC –control voltage.

VHF–part of PLL

The reference frequency for VHF PLL is 1 MHz. After phase comparison, the output signal is low–pass filtered to DC –level, which is used as reverse voltage for capacitance diode (V842). VHF –VCO is made out of discrete components, and it consists of BJT(V840) –oscillator circuit and buffer(V841). The output frequency, which is used as second injection for RX, is 400 MHz for all channels.

Synthesizer Signal levels and frequencies

UHF Synthesizer Malfunction

Setting of PCLocals

Active unit	:	RX or TX
Operation mode	:	Continuous (RX) or Burst (TX)
Continuous Mode Ch	:	Channel will be changing

Synthesizer locked (Control voltage depends on channel)

	Test point	Position	Frequency	*Level	Note:
1	C821			~1.5V	CMch:512
1	C821			~2.0V	CMch:661
1	C821			~2.6V	CMch:810

Voltages of synthesizer N820 :

	Test point	Position	Frequency	*Level	Note:
2	N820 pins 1,20		DC	4.0V	Pow. supply
3	N820 pins 2,19		DC	4.6V	Charge pump

UHF VCO (G1) output:

	Test point	Position	Frequency	*Level	Note:
4	RFOUT		DC	4.6V	Vcc
5	”		1617.2 MHz		RX / CMch:512
5	”		1647.0 MHz		RX / CMch:661
5	”		1676.8 MHz		RX / CMch:810
5	”		1650.2 MHz		TX / CMch:512
5	”		1680.0 MHz		TX / CMch:661
5	”		1709.8 MHz		TX / CMch:810

Reference oscillator VCTCXO

	Test point Position	Frequency	*Level	Note:
6	V800	DC	~2.5V	
7	N820 pin 8	26MHz	$1V_{pp}$	f_{ref}
Bias	V801 C	DC	3.2V	Bias
Bias	V801 B	DC	1.8V	Bias
Bias	V801 E	DC	1.1V	Bias

– check the crystal and other components in oscillator circuit.

VHF Synthesizer Malfunction

Voltage from Do IF

	Test point Position	Frequency	*Level	Note:
8	C823	DC	2.5V	(all channels)

Voltages of N820

	Test point Position	Frequency	*Level	Note:
9	N820 pins 1,20	DC	4.0V	Pow. supply
10	N820 pins 2,19	DC	4.6V	Charge pump

Biasing voltages on VHF

	Test point Position	Frequency	*Level	Note:
Bias	V841 C	DC	4.3V	Bias
Bias	V841 B	DC	3.2V	Bias
Bias	V841 E	DC	2.5V	Bias
Bias	V840 C	DC	2.4V	Bias
Bias	V840 B	DC	1.5V	Bias
Bias	V840 E	DC	0.8V	Bias

– Check the components surrounding V840 and V841, and make sure that V842 has been soldered as the component location picture shows it.

– Check the following components: R827, R828, R840, C823, C824, C830, C840

Frequency

Test point	Position	Frequency	*Level	Note:
C850 (VHFLO)		400 MHz		(all channels).

UHF– and VHF SYNTHESIZERS OK

To ensure the 400 MHz –signal for the third mixing in N551(CRFRT), check the following components:

L551, C551, C552, C553

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